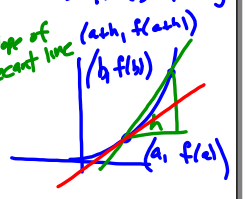
Review 6 Average & Instantaneous Rates of Change

Ave Rate $= \frac{y_2-y_1}{x_2-x_1} = \frac{f(b)-f(a)}{b-a}$ slope of secant line



Inst Rate $= \lim_{b\to a} \frac{f(b)-f(a)}{b-a}$

RHDQ $\lim_{h\to 0} \frac{f(a+h)-f(a)}{h} = f'(a)$

slope of tan line der at $x=a$

Feb 28-8:58 AM

Ex 1

Time (mn)	0	4	8	12	16
Temp (°C)	65	68	73	80	90

a) Estimate the inst. rate at $t=10$

b) Explain the meaning of your answer in (a)

SDQ a) $\frac{80-73}{12-8} = \frac{7}{4}\ \frac{°C}{min}$

b) The temp is changing about 7°C every 4 min at $t=10$

$\frac{7}{4}$ °C every min

Feb 28-9:55 AM

Ex 2 Which of the following best approximates $\frac{\ln(2+h)-\ln 2}{h}$ for small values of h?

a) $\ln(2)$ b) 1 c) $\frac{1}{2}$ d) 0 e) undef

$\lim_{h\to 0} \frac{\ln(2+h)-\ln 2}{h}$ $a=2$ $f(x)=\ln x$

$f'(2)=\frac{1}{2}$

$\lim_{h\to 0} \frac{f(a+h)-f(a)}{h} = f'(a)$ $f'(x)=\frac{1}{x}$

Feb 28-10:06 AM

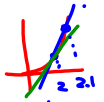
Ex 3 A rock falls a distance of $y=16t^2$ (y in ft) (t in sec).

a) Find the ave vel for $[2, 2.1]$

b) Does this ave vel overestimate or underestimate the inst vel at $t=2$? (Justify)

a) $\frac{16(2.1)^2-16(2)^2}{2.1-2.0} = 65.6\ \frac{ft}{sec}$

b)



over est.

ave vel = slope of sec

inst vel = slope of tan

Feb 28-10:21 AM